

Saimaa University of Applied Sciences  
Faculty of Technology Lappeenranta  
Double Degree  
Information technology

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## **TehoCRM system for Tehohydro company**

Thesis 2014

## **Abstract**

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TehoCRM system for Tehohydro company, 35 pages

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This bachelor thesis describes software development connected with the Tehohydro company located in Lappeenranta, Finland. The goal of the work was to create new application that would help to increase the efficiency of customer Relationship Management.

This application was created using Microsoft technologies. The application is developed in C# language using .NET framework 4.0. The graphical user interface is designed in Windows Presentation Foundation (WPF). As a development environment Visual Studio was used and database related tasks were done by SQL Management Studio.

The result of the project is Customer Relationship Management information system that is offering customers' evidence, creating marketing campaigns and planning and meetings with customers. The application was developed in cooperation with one company but the design is general and this system can be used by any other company for the described purposes.

Keywords: CRM, C#, SQL, WPF, Software Development, .NET

## List of terms

.NET	technology platform by Microsoft for creating software products
CRM	Customer Relationship Management
ER-diagram	Entity-Relationship diagram
GUI	Graphical User Interface
IMAP	Internet Message Access Protocol
IT	Information Technology
MVC	Model-View-Controller
MVVM	Model-View-ViewModel
RUI	Rich User Interface
SQL	Structured Query Language
TFS	Team Foundation Server
VSO	Visual Studio Online
WPF	Windows Presentation Foundation
WYSIWYG	What You See Is What You Get
XAML	eXtensible Application Markup Language

C#	Name of a programming language mostly used for a development with .NET framework.
Direct3D	It is a specialized interface that offers a wide range of functionalities For three dimensional graphic.
SCRUM	It is an iterative and incremental agile software development framework.
SQL Server	Database machine by Microsoft company.
WinAPI	Windows API is an interface developed by Microsoft for the Microsoft Windows operating system. All programs are independent on used programming language.
WinForms	Windows Forms is a name of the interface for the programming of Windows graphical applications

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# 1 Introduction

This part of the thesis is focused on the project related to CRM (Customer Relationship Management) system in Finnish company Tehohydro. The company was using several applications and techniques for the communication with customers and the goal of this project was to unify all functionalities into one application that would be used by employees.

Customer relationship management is a very important part of a company management for all companies that want to have satisfied customers who like your company. Generally it is a model for managing company's interactions with current and future customers. It involves using technology to organize, automate and synchronize sales, marketing, customer service and technical support.

CRM is creating long-term relationships with customers. Those relationships have to be rewarding for both, customer and company (win-win situation) so it is excluding unethical behavior to customers.

Well-designed CRM includes the following characteristics:

- Relationship management is a customer-oriented feature with service response based on customer input, one-to-one solutions to customers' requirements, direct online communications with customer and customer service centers that help customers solve their questions.
- Salesforce automation. This function can implement sales promotion analysis, automate tracking of a client's account history for repeated sales or future sales, and also coordinate sales, marketing, call centers, and retail outlets in order to realize the salesforce automation.
- Use of technology. This feature is about following the technology trend and skills of value delivering using technology to make "up-to-the-second" customer data available. It applies data warehouse technology in order to aggregate transaction information, to merge the information with CRM solutions, and to provide key performance indicators.
- Opportunity management. This feature helps the company to manage unpredictable growth and demand and implement a

good forecasting model to integrate sales history with sales projections.  
[1,2]

The first part of this thesis describes the architecture, functionality and database of TehoCRM, the program created for Tehohydro company. Methods and technologies used in development are mentioned as well and this document could be used by anyone for understanding of this application for example for future extendings.

The first chapter of CRM part describes the actual situation in the company, what programs they are using, why they would like to have new a program and what is expected from new application. In the following chapter the used technologies with their explanation are named.

The fifth and sixth chapter describe the architecture of the new information system. The fifth chapter is devoted to the database design and architecture. Chosen technologies are described and also the designed architecture is commented. The sixth chapter is devoted to the user interface description and all internal functionalities of the application.

The last chapters are evaluating how targets and requirements were met, plans for future improvements and extensions and summarizing the entire project.

## **2 About the project**

The beginning of this project is dated to December 2013 and cooperation with Tehohydro Oy was started.

First some changes and upgrades were done in Job-ticket system. Job-Ticket is an information system made by last year double degree students for Tehohydro and it is used for working tasks' evidence. Stored information includes the task, type of task and customer and what was done with a product by service men. In Job-Ticket there were some problems that so the system was not in use and had to be upgraded. Those errors were connected with printing and data displaying. Improvements were related to creating new tasks where new features were added to simplify application usage and speed it up. When all the desired changes and upgrades were done and all problems were fixed possibilities for the next task were discussed. As the best possibility has been chosen project for a new CRM application. This issue was about creating a new application that would be able to replace the actually used solutions.

First, analysis was necessary to find out all possibilities and functions that are offered by modern CRM systems. All those applications offer many useful functions but for Tehohydro the highest priority is for easy usage and the most important is effective communication with customer with possibility to extend this application in the future when needs could raise.

## **3 Tehohydro Oy**

Tehohydro is a company from the South-East Finnish city Lappeenranta and nowadays is becoming an international company due to their expansion to Russia and offers to all customers services related with hydraulics and pneumatics. This company was founded in 1983 (European Commission, 2005) and the company's business is focused on the maintenance and repairs of the various pneumatic and hydraulic tools and devices and also important part is the development of its own products.

They have many specialized devices for providing plenty of tests and analysis for checking products' correct functionality and also for measuring techniques for checking levels of impurities in oil and water. These devices are collecting data for precious analysis that is very important for customers' problems troubleshooting because often repairing a device could be very expensive and thanks to precious measuring the mechanic is able to advise the customer if it is better to repair and maintenance problematic device or if it is much profitable to purchase a new one.

Most of the company's customers are medium-sized and big companies and machines shops from South Karelia and Kymenlaakso where the main work area is situated but as mentioned before, during the last years the company is expanding to the Russian market. The company's headquarters is located in the city of Lappeenranta and it also serves as a factory and shop in which customers can buy all necessary components or bring their broken device to repair. Figure 1 shows the company's building in Lappeenranta.



Figure 1 - Tehohydro Oy, Lappeenranta [3]

In the growing international company like this is the contact with customers a very important part of management and requires a professional approach. All data about customers need to be stored in a database and controlled by an appropriate application. Data about customers can be simple like a full name, contact information etc., but for better service you should be able to store something more which shows that you take care of them like to send to customer greetings to birthday with some special offer or other similar information.



A Properly designed system is also very useful in marketing because if you have all your customers in the database and divided into logical groups and the application is able to send email, you can create an email marketing campaign effectively and make your company more visible.

## 4 Current situation of CRM in Tehohydro

In the following chapter, the current state of CRM in Tehohydro is described. The chapter also describes technologies and application used to perform the required tasks and expectations from new application.

### 4.1 MS Access

Tehohydro is a company with many customers and the requirement appeared a long time ago. Many years the company was using simple database designed in MS Access with a user interface based on MS Access forms. Welcome page is shown in the Figure 2.

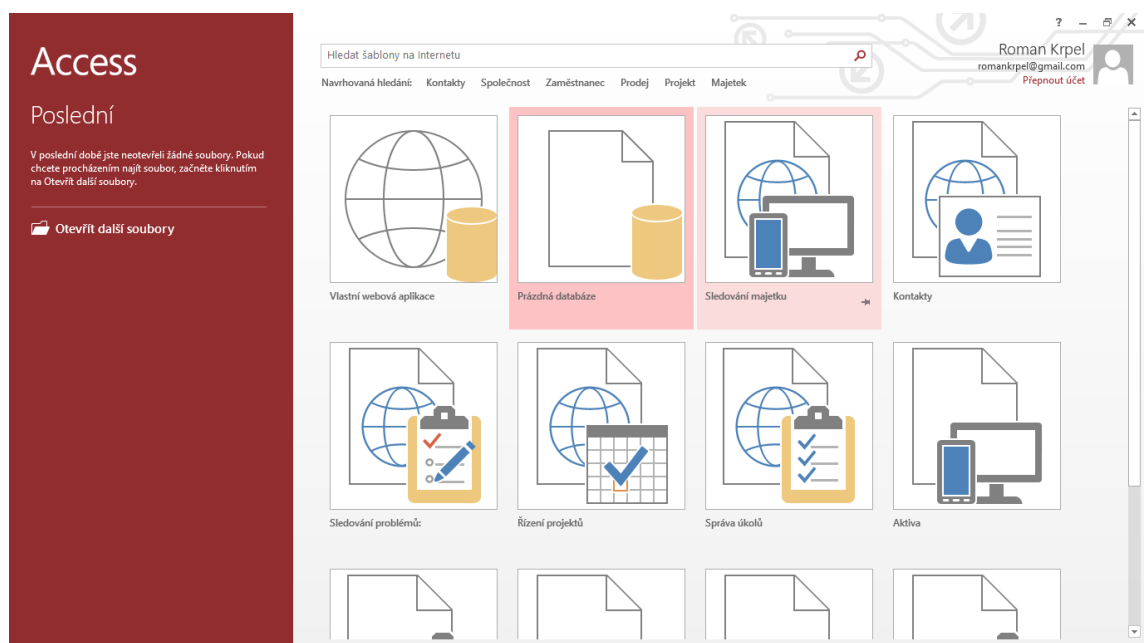


Figure 2 - MS Access environment

MS Access is a software created by Microsoft and it is a tool for managing relational databases. The relational database is a set of tables mutually connected

by logical relations corresponding rules of Relation database model. This model was developed by Dr. E. F. Codd.

In MS Access you are also able not only to create a database but to design a simple application that use this database. The application is then based on forms designed in MS Access by mouse-clicking where you choose the desired functions and properties. [4]

During years many new customers were added into this database and one problem was slowly coming. MS Access is a primary targeted as a single person application and in corporate where it is necessary to allow multiple access program in MS Access was not good enough. All customers and their information were managed by head of the company and everytime when a customer was contacted by any employee, he had to send message to head with information about questions, customer's needs and requirements or for example the date and hour of a planned meeting. Sometimes, due to many of those messages it could happen that some message could be lost and appropriate information wasn't stored in MS Access database. As you see, this approach is very ineffective, produces many errors and slows down.

## **4.2 SugarCRM**

SugarCRM is an Information Technology (IT) company from the United States that produces web application for customer relationship management Sugar, also known as SugarCRM. This software was for a long time distributed under both Open Source and Commercial open source license but since February 2014 is Community Edition no longer in development and only bug fixing updates will be released. [5] Figure 3 shows one of the installation pages.



Figure 3 – SugarCRM [5]

Tehohydro started using this application last year because they realized the application in MS Access is no longer powerful and capable enough. The application is too robust for their usage and instead of the simplification of the work it makes it harder.

Also data conversion is not done so all information about customers is first inserted into MS Access database and then to SugarCRM. This approach is very time wasting and plenty of errors and mistakes can arise.

#### 4.3 New system requirements

The idea for a new application is mainly simplicity of use with accomplishing all requirements like:

- Storing all possible information about customers with an ability to add new items from the application
- Application supports users with different rights and levels of access and logging with unique user name and password
- Sending emails to customers and storing dates of those emails into calendar for evidence when customer was contacted

- Ability to store information about planned meetings and displaying them in a calendar with notifications

A very important part of work will be data conversion from the previous storage, in this case MS Access database. For this purpose special functionality will be created with defined rules describing how old data columns would be transferred into the new database scheme.

## **5 Technologies used in development**

The next chapters describe technologies used to create the new application. All technologies are created by Microsoft and together they are offering an integrated base for the development.

### **5.1 SQL Server and Management Studio**

SQL Server is the database server made especially for relational databases and in this project it is used for storing data from the application. SQL Server is made by the Microsoft company and it can be used in any application from small programs with simple database design to big corporate systems with many databases and advanced storing techniques.

The Management Studio is a tool for controlling databases and the whole database server, running scripts and doing all other tasks necessary for data storing.

### **5.2 Visual Studio 2013**

As a development environment for creating TehoCRM Visual Studio 2013 in Ultimate edition by Microsoft as the best tool for creating .NET applications was chosen. Ultimate edition is the highest edition of the Visual Studio and contains plenty of necessary tools for software development like tools for Unit testing, optimization and many others. A very handy tool for optimization is used for finding the slowest parts of code. This tool analyzes the application during run-time and then shows the slowest parts of code. After this you can optimize the code to provide higher performance.

The next very often used part is Graphical User Interface (GUI) designer. This designer is the What You See Is What You Get (WYSIWYG) editor and you can easily create the whole user interface without writing many rows of the source code. There is also a toolbar with components you can use in your GUI. Many components are included in .NET framework but if you need some more specialized, you can create them, add reference for the project with those components and they will be available in the toolbar then. Figure 4 shows the environment with the GUI designer.

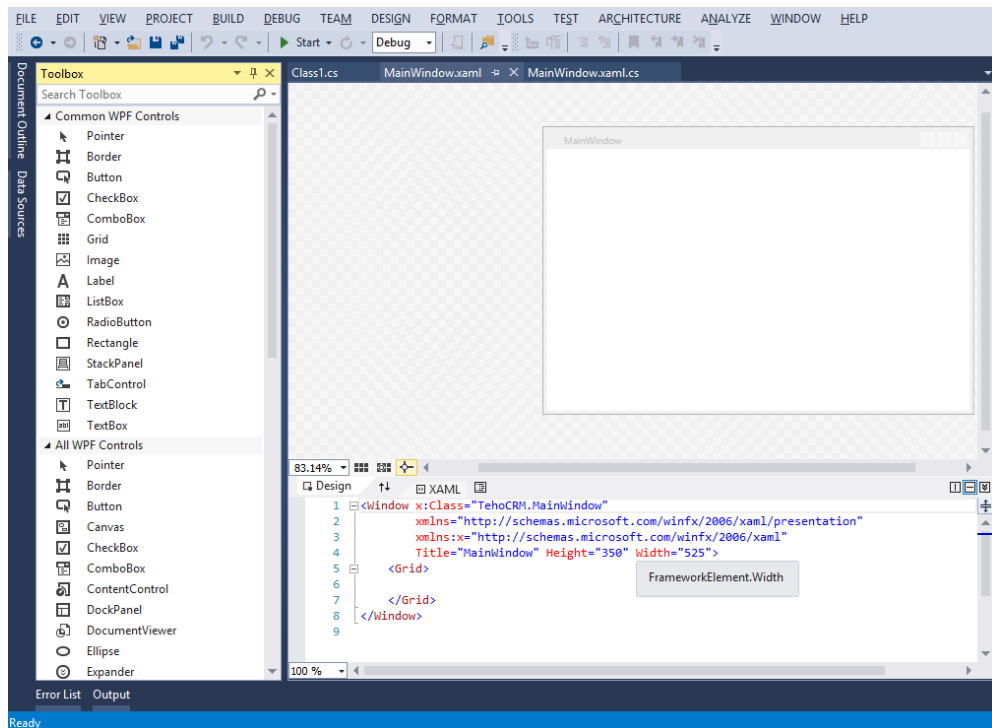


Figure 4 - Visual Studio GUI designer

### 5.3 Visual Studio Online

Visual Studio Online (VSO) is the new functionality introduced with Visual Studio 2013 and it is a tool that is based on functionality of Team Foundation Server (TFS) used for code sharing and versioning with development team members but for this version you do not need your own TFS. Visual Studio Online runs on Microsoft servers and provides to developers an easy way how to version their application and how to back up it. [6]

Control panel for VSO is included in Visual Studio environment so you can use it without necessity to install any plugin. There is also a web application for managing your projects, inviting team members into project etc. In the Figure 5 there is an environment of the web application.

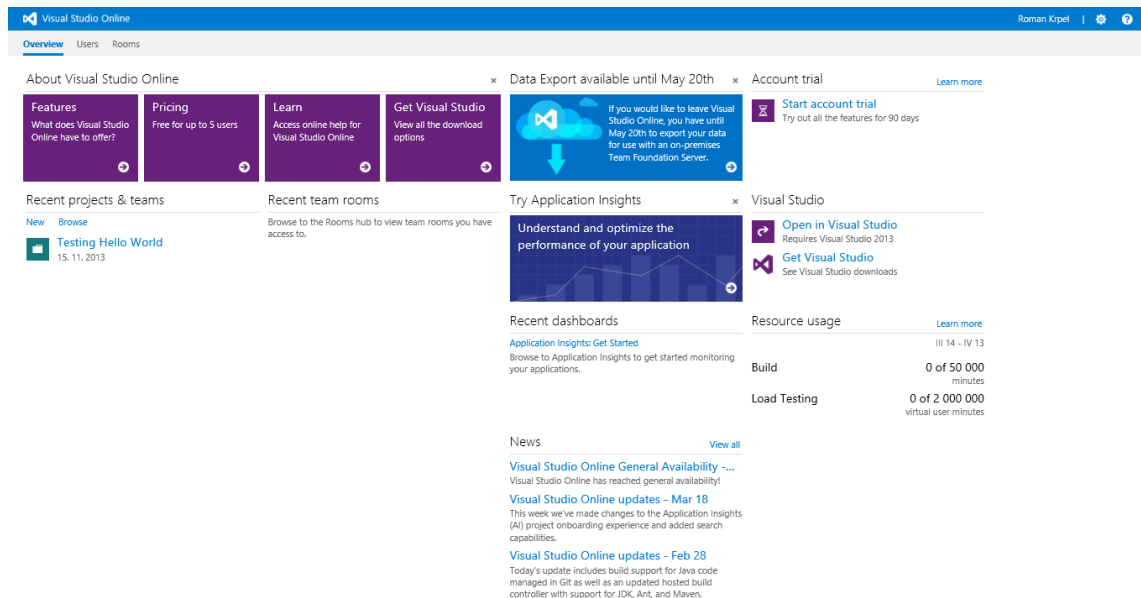


Figure 5 - VSO web application

Very useful could be application testing on Microsoft cloud servers where you can run your application for some time (depends on how many hours you buy) and do the stress testing.

## 5.4 OneNote

OneNote is a more powerful version of Notepad. Notepad is a handy application for making simple notes used only by one person. OneNote is much better in this because it offers creating named groups of notes. For a long time OneNote was available only as a part of Microsoft Office suite but now it is free to download and use and it is useful for team development because notes can be shared and edited by team members via the Microsoft OneDrive.

In this project OneNote was used for creating notes about the application, the development and other related tasks. [7]

## 5.5 Visio

Visio is a professional software originally developed by Visio Corporation for creating various types of diagrams. Nowadays Visio is a product by Microsoft and it offers various base categories for creating business, engineering, software and database, network diagrams or creating flowcharts, schedules etc. Each of the mentioned categories contain various templates of diagram. In this project ER-diagram, Class diagrams, data flow diagrams and use case diagram were created in Visio. [8]

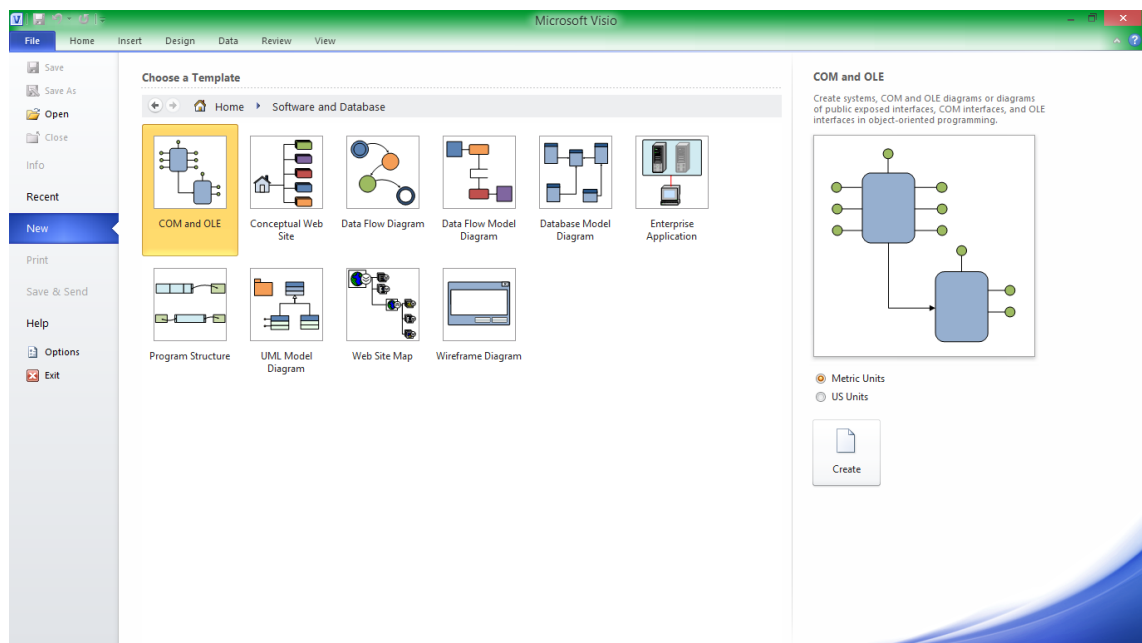


Figure 6 - Visio

The Figure 6 shows the welcome page of Vision application with choosing the desired template.

## 6 New system – TehoCRM

Based on preceding information and requirements the development of the new application started. The new application was designed to be flexible for future extensions if new requirements appear. A big advantage of TehoCRM is that this application is designed directly according to the customer's requirements and necessities and due to this it is helping the company's management without any concession or compromise.

## 6.1 Architecture

The application uses Model-View-ViewModel (MVVM) design pattern, a design pattern created by Microsoft as a specialization of the Presentation Model design introduced by Martin Fowler. It is based on the Model-View-Controller (MVC) design pattern, but MVVM is targeted at development of UI platforms like Windows Presentation Foundation (WPF) and Silverlight on the .NET platform using extensible Application Markup Language (XAML) and .NET programming languages. Those architectures are dividing application into separated layers.

MVVM is designed to separate the development of GUI from the business logic development or back end logic represented here by the model. The advantage of this approach is independence of those two layers. If you create an independent and fully working business layer, you can create as many user interfaces as you want without the necessity to change the logic. It means you can create a web application, a desktop application, a mobile phone applications and all those applications will be using the same internal logic. [9]

The next separation is done in the internal logic to separate the domain logic of the application and the database layer. Database layer is responsible for mapping objects from relational database tables and relations. It means that the business layer is responsible only for all functionalities and properties of the application and database layer provides data to be processed by the business layer. Diagram of the three layer architecture is shown in the Figure 7. Three layers of the application are:

- **Presentation Layer**

This layer is GUI of the application and functionalities that take care of information transfer from business logic to application user

- **Business Layer**

All application functionalities and internal logic is created in this layer. Also it takes care of data and information transferring from user interface to the database.



- **Data Layer**

This layer is responsible for data manipulation in database and loading it to the application for another layers. All Structured Query Language (SQL) queries are written in the source code of this layer and this layer also contains classes for representation entities stored in the database.

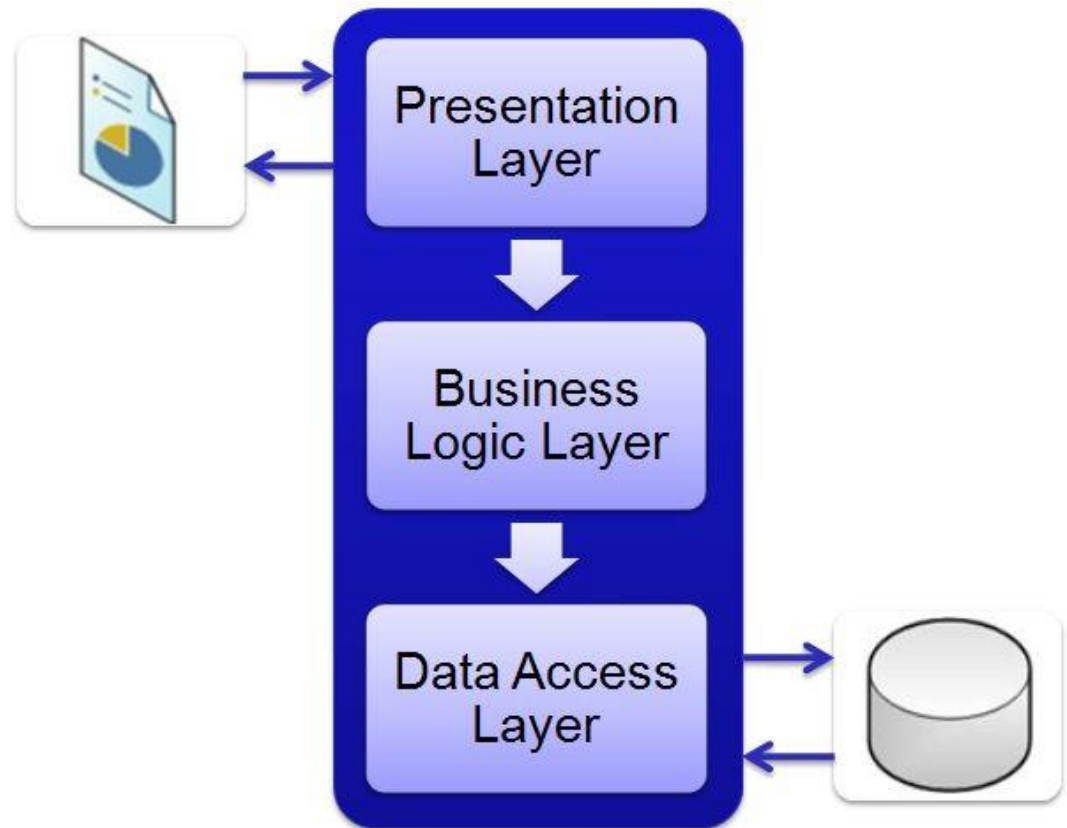


Figure 7 - Three layer architecture diagram [10]

## 7 Database

This chapter is devoted to the database and all important facts about the used database techniques and structures.

### 7.1.1 Database specification

As a database machine Microsoft SQL Server is used because it is a machine with all modern functionalities and also it is able to express edition which is completely free to use and the only limitation is in usage of hardware. For the purpose

of this application and the number of users in a company size like Tehohydro this is not a problem or limitation.

### **7.1.2 ER-diagram**

Entity relationship diagram (ER-diagram) is used to show all entities and their relations in the database scheme. This diagram shows the situation when the application is freshly installed because it is possible to add new columns to tables to store new desired information. ER diagram for the application is in the Figure 8.

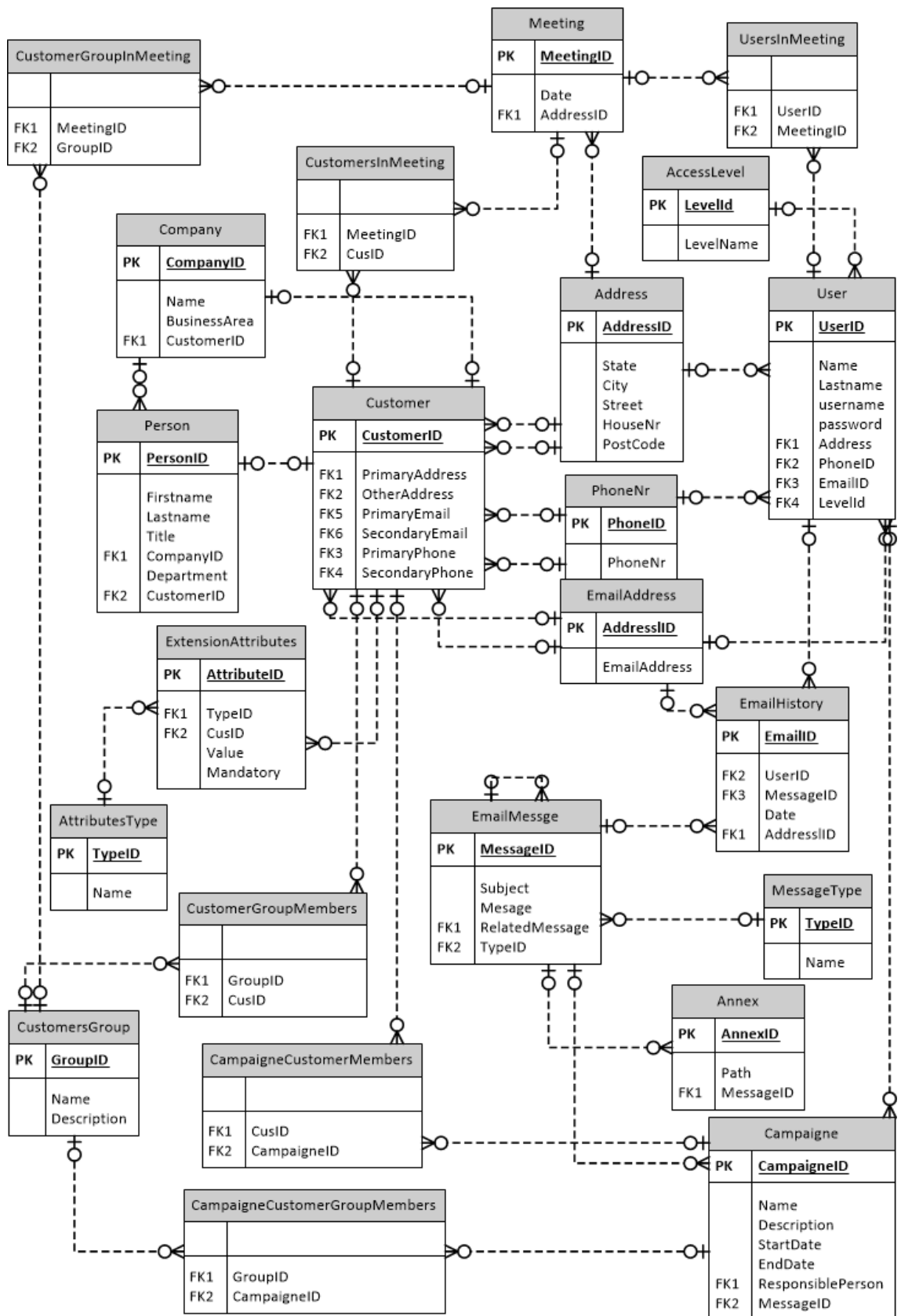


Figure 8 - ER diagram

Technical details are in the following chapter.

### **7.1.3 Data structure**

The following paragraphs describe the technical details of tables, columns and used settings.

All primary keys are auto incremented integers. Integer is a data type for storing whole numbers and in database it is represented by 4 bytes, so it can store numbers from  $-2^{31}$  to  $2^{31} - 1$ . For IDs only positive values are used so in every table hold  $2^{31}$  records can be. This number is big enough and it is not expected that the company would have more customers than this. [11]

Very important for the end user is the very quick user program. Sometimes it could be hard to secure it and especially finding data in big tables and filtering could be very slow. For this purpose indexes are very important. Indexes are special data structures (trees, hash tables, etc.) that can speed up finding a proper row of the table under conditions in SQL query. All indexes are causing that operations like adding new rows or editing rows are slower because indexes need to be recreated but in tables where operation find is very often it is necessary to create proper indexes and even if adding and editing is slower general performance of the application is much better.

### **7.1.4 Data migration**

As written above, data from the previous databases needed to be transformed to the new database. However, the consistence of data and all relations were not fully proper and data analysis was necessary.

After all relations, entities and domains were successfully analyzed some problems appeared because all data was not consistent and it was impossible to create a script that would be able to convert all data correctly into the new database. One possibility was not to transfer all data, start from the scratch and insert all customers manually but this was not acceptable. The company already has more than one thousand records about customers and it would take too much time to insert them manually again.

The second and also chosen way was to create an application that would transfer all consistent and correct data into the new database and inconsistent data would

be left in old database and only those would be transferred manually. This approach is much better and the only problematic parts are not transferred automatically.

## **8 TehoCRM application functionality**

This chapter describes the application functionality, shows the user interface and explains how the application is designed and how to use it.

### **8.1 Data design**

The next paragraphs describes objects responsible for operating with the main functionalities – customer, customer group, meeting and campaign.

#### **8.1.1 Customers**

Customer is the most important object in a CRM and all operations are connected with this object. If you have as a user appropriate rights you can list, edit or create a new customer and also add new properties stored in the database. Type of properties could be bool that represents yes/no questions, string, integer number, float number or date. For storing the user defined properties in the database there is a table Extension Attributes where all extension data is stored.

Customers are divided into two groups. The first one is a company and the second one is a person. Customer is a base object and person and company are inherited. Due to this different properties can be stored for each type of customer and references from other objects to person or company are done to the base object customer. Diagram with the customers' architecture is on the Figure 9.

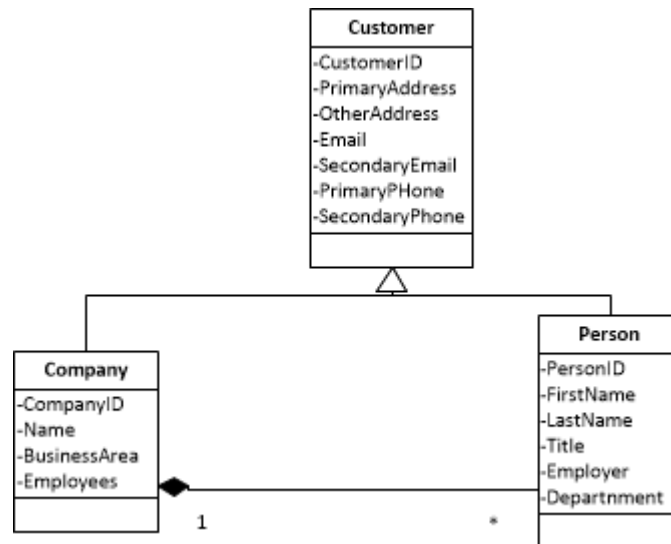


Figure 9 - Customer objects relationship

Figure 7 shows how Customer and inherited classes are related to each other. On the diagram there are no other properties that refer to the related objects. Those references are shown on ER diagram.

### 8.1.2 Customer groups

Customer groups are groups of customers. Companies and persons are derived from customer so in groups there could be a mixture of them. The advantage of groups is that you can create thematically named groups for example for big customers, medium-sized customers, or groups for different areas of customers and organize meetings or marketing campaigns for whole groups. Groups are referenced in the same objects as single customers, you can use them simultaneously.

### 8.1.3 Meetings data

Meetings are as the name suggests designed for organizing meetings with customers. Every meeting could be assigned a collection of customers, a collection of groups and a collection of users – employees. Other properties are address, date of meeting with time.

### **8.1.4 Campaigns**

Campaign object is designed for creating marketing campaigns. For campaigns there are also functionalities for sending emails. Every campaign has reference to the user as a responsible person. As mentioned before you can add customers and customer groups to campaigns and an email will be sent to all members.

To store information about a campaign there is object EmailMessage. There is prepared email stored and when the campaign has defined the start date, end the date and the frequency emails are sent automatically.

## **8.2 User Interface**

For user interface Microsoft technology Windows Presentation Foundation (WPF) was chosen. WPF was publicly announced in 2003 as new technology for creating Windows user interfaces replacing Win Forms. Win Forms and GDI were for a long time standard for programmers but WPF brings a new approach in user interface development. This technology is not only for the desktop UI (user interface) but it is also the basis for Silverlight, which has extended WPF technology onto the Web and into devices such Windows phones.

WPF is a subset of .NET framework since version 3.0 uses XAML markup language for creating RUI (Rich User Interface). XAML is based on XML (eXtended Markup Language) and by default uses MVVM design pattern to separate the application functionality and the user interface. [12]

### **Graphics**

All graphics including windows is based on Direct3D libraries so it supports.

- Hardware acceleration on the graphic card and advanced graphical options
- Vector graphic that is scalable across screen resolutions and the content is always perfectly sharp
- 3D rendering is supported

Even if the WPF is much newer than Win Forms, both technologies are cooperating so you can use Win Forms' controls in WPF application and support for WinAPI is also guaranteed so you can host WinAPI code in WPF and conversely.

### 8.2.1 Main Window

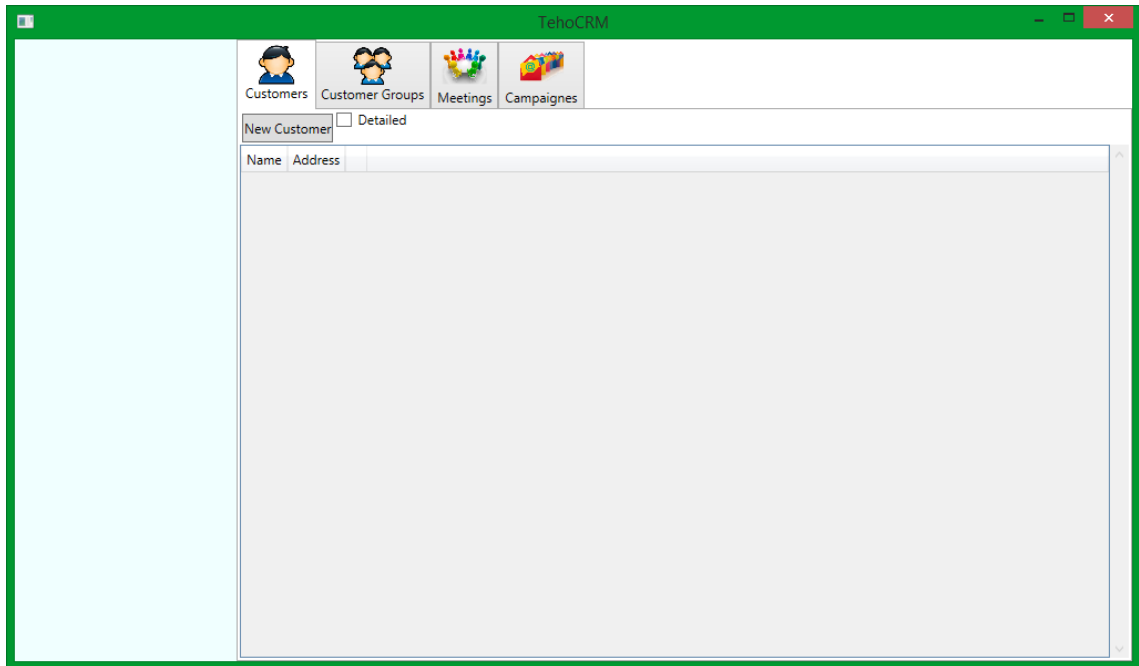


Figure 10 - Main window

The main window of the application is divided into two parts as it is shown in the Figure 10. Left part is smaller and it is showing information about the actually logged user. Information contains the full name for better orientation and information about the actual day's events so all meetings planned for actual day are easily accessible.

The right part of the main window is larger and contain tabs with all functionalities.

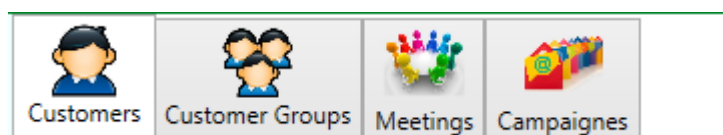


Figure 11 - Tab panel

As you see in the Figure 11 on the top there are tabs with icons for better orientation. As names suggest over these tabs you can work with customers, groups,



meetings and marketing campaigns. When you click on any of tab, a list of corresponding objects is shown. If you select any of them, the control is switched to the second part where you can edit all related information about the selected object. Right below tabs are always buttons for creating a new object and deleting the selected one.

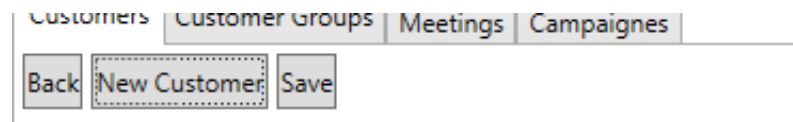


Figure 12 - Control buttons

In the Figure 12 there is shown how buttons for concrete control are right bellow tabs and all controls are together.

### 8.2.2 Customers control

If you click on the Customers tab, a list of customers is shown. That list you can see in the Figure 13. As mentioned before, between the tabs and the control there are buttons for adding new customer or removing the selected one.

Headers of the list contain the name of the customer, the address and the phone number and email. If you need more information, double click on the desired customer and a detail view is shown.

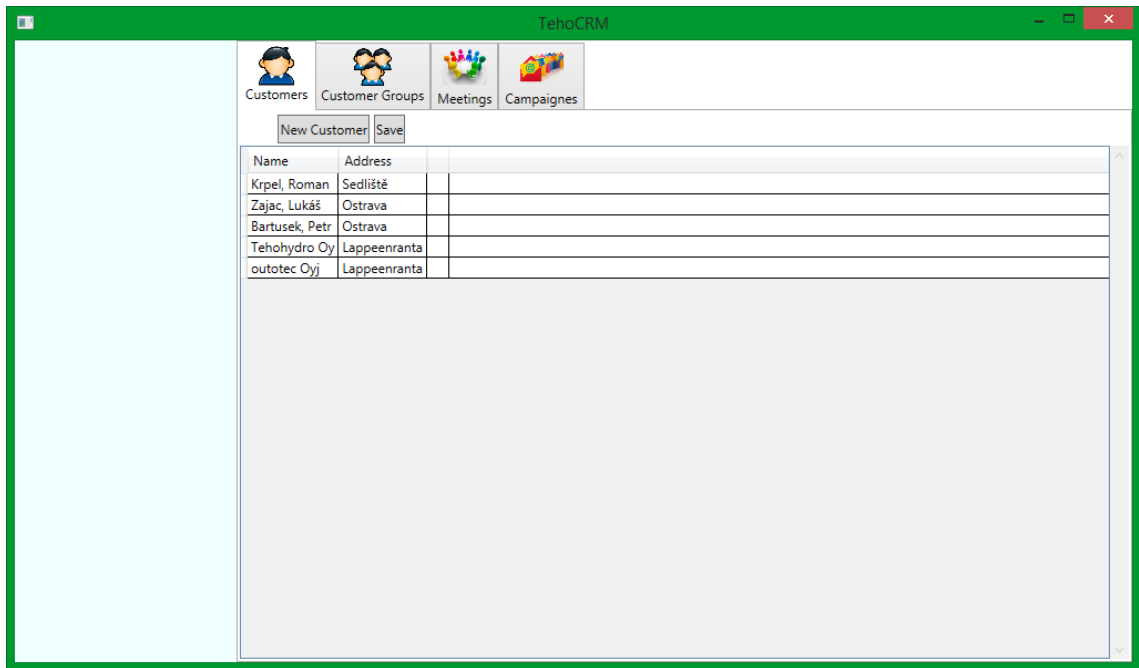


Figure 13 - List of customers

The detailed view contains all information about a customer. Depending on the type of customer, person or company, appropriate labels and text boxes are shown for general info and lists with collections of meetings, campaigns and employees in the case of the company. In the figure there is information for the company and person together. In a real application only text boxes for concrete type of customer are shown. All fields from the detailed view are shown in the Figure 14.

Figure 14 - Customer detail view

To create new a customer you have to fill in all mandatory information. In case of a company it is the name of the company. If you are creating a person, mandatory fields are the first name and the last name. To save changes or to add created customer, click on the Save button on the button panel.

### 8.2.3 Customers' group control

The customers' group control is connected with the Customers' group tab in the tab control. Same as before in control for customers, first the list of groups is shown. If you want to display a detail of some company, double click on the appropriate row. If you want to create a new customer, same button as for customers is on the top of the control as you see in the Figure 15.

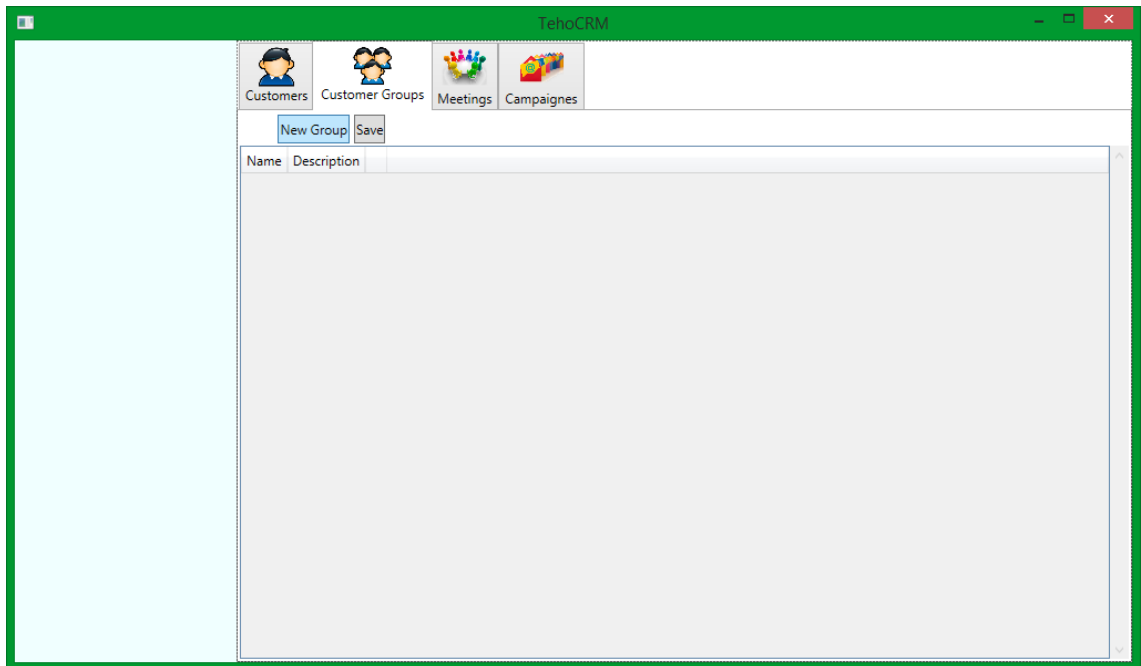


Figure 15 - Group control list

The detailed view contains describing information about a group like a name and a description. Under those there is a list of the group members. Detailed view is on the Figure 16.

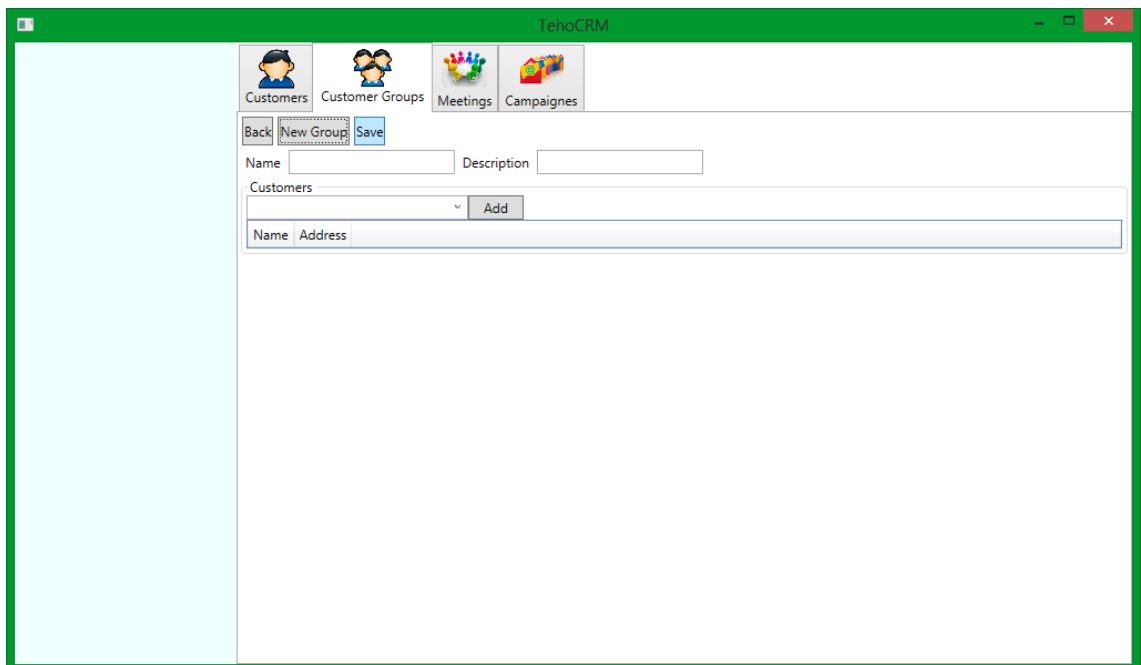


Figure 16 - Detail view of a group

For saving changed or created groups there is again the save button.

## 8.2.4 Meetings' control

The layout of the control is the same as in previous controls. First is shown list of meetings is shown as you see in the Figure 17.

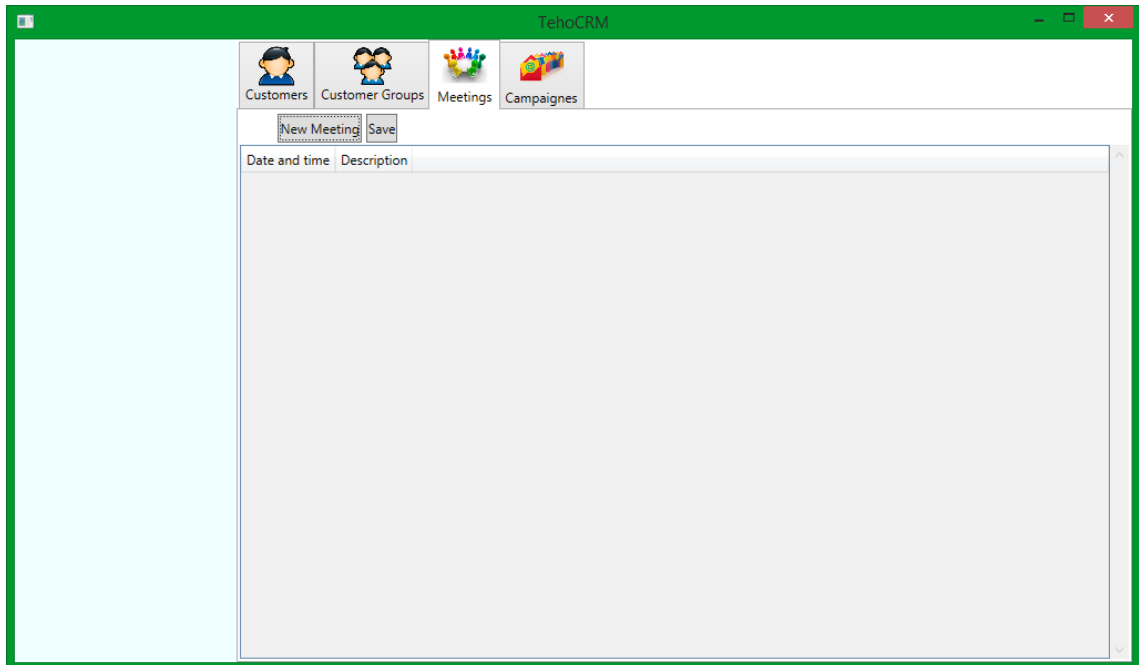


Figure 17 - List of meetings

The detailed view contains information about the date and the time of the meeting, the description, the address and lists of customers, groups of customers and employees that are going to join the meeting. Detailed view is in the Figure 18.

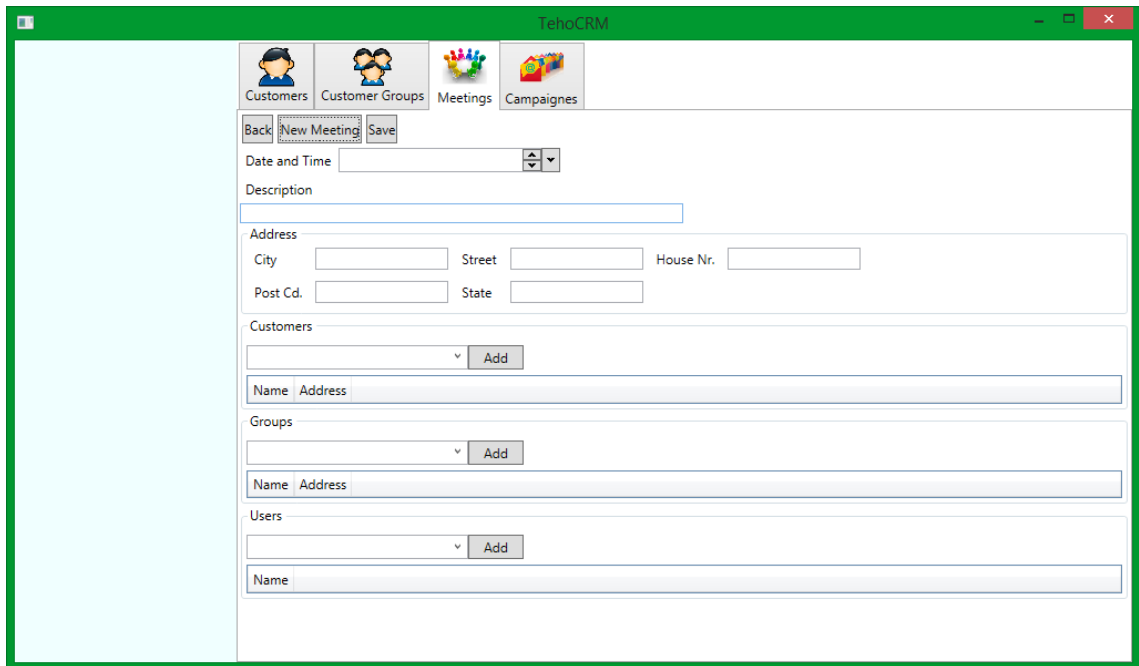


Figure 18 - Meeting's detailed view

For creating and saving meetings there are buttons on the top.

### 8.2.5 Campaigns' control

The control with campaigns contains list of campaigns. That list is visible below in the Figure 19.

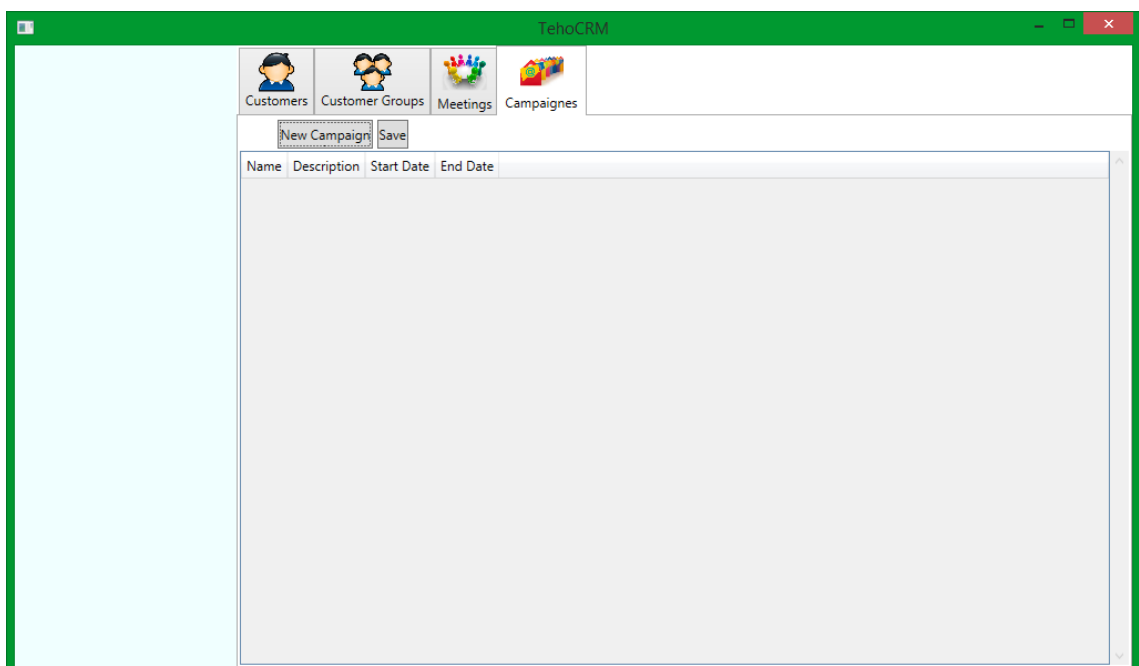
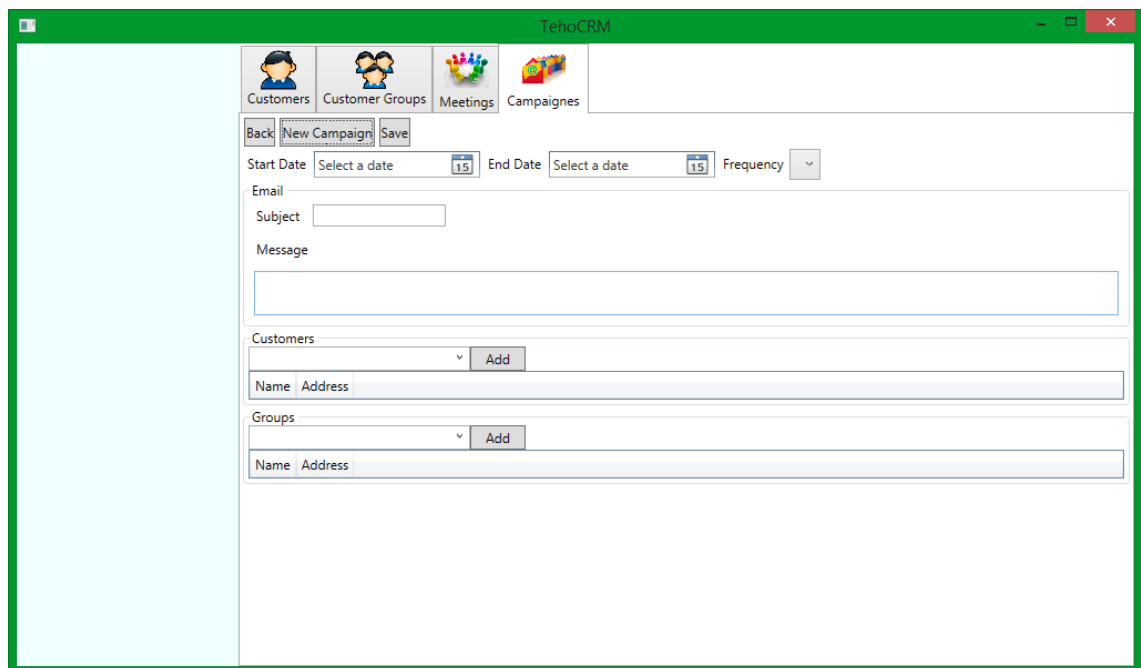


Figure 19 - List of campaigns

The detailed view contains information about the dates, the frequency of sending messages. There are also fields for the prepared email message and lists of customers and groups as the members of the campaign. This is shown in the Figure 20.



The screenshot shows the TehoCRM application window. At the top, there are four navigation tabs: Customers, Customer Groups, Meetings, and Campaigns. The Campaigns tab is selected. Below the tabs, there are three buttons: Back, New Campaign, and Save. The form contains the following fields: Start Date (with a calendar icon and '15'), End Date (with a calendar icon and '15'), and Frequency (with a dropdown arrow). Under the 'Email' section, there is a Subject field and a larger Message field. Below the form, there are two sections: 'Customers' and 'Groups'. Each section has a dropdown menu and an 'Add' button. The Customers section has a table with columns 'Name' and 'Address'. The Groups section also has a table with columns 'Name' and 'Address'.

Figure 20 - Campaign's detailed view

On the top there are also control buttons.

## 9 Evaluation

This chapter discusses objectives that were set on the beginning of the project and how those objectives were met and implemented. After the review plans for future improvements are discussed.

### 9.1 Meeting the requirements

The idea of the application was clear since the beginning but single functionalities were not known all the time. Some of them appeared during the development. Most of the application's functionalities specified at the beginning are already implemented and rest of them are in progress. Data migration is going to be done

in next weeks. Now the Tehohydro is preparing translation of the previous database and then all data about customers could be migrate. Then the application will be ready soon and company can start a testing usage to find out if everything goes well in the real business.

## **9.2 Future improvements**

During the development some new ideas came as possibilities to extend the application. Main planned functionality is to enable Internet Message Access Protocol (IMAP) support. IMAP is protocol for connecting to an email box. This principal is used by email clients like Thunderbird or MS Outlook. When the application will be able to connect with email box, entire communication with customers can be stored in the application, all messages can be highlighted in calendar and management will be more efficient.

## **10 Summary**

Information systems are nowadays are integral part of every company. It is also the most widely used part of information technologies by corporate users. All those systems are collecting and storing data from the company's business, processing them and offering results to the end user or automatically doing preferred and desired actions. This thesis described the design and development of the new information system for a real client that is dealing with customer relationship management. This information system is called TehoCRM and it is improving all functionalities from the previous system. New functionalities are also added and in case of some new requirements the system is designed to be easy extendable.

The whole information system was developed by using Microsoft technologies in all steps of development. This task was discussed with the client and is based on the actually used system in data part. The Tehohydro company had a big database of customers and all data needed to be migrated into the new application. The whole development was done with the knowledge of SCRUM model in which small functional steps are made and this way entire information system is build. I was adding new and new functionalities to create requested application. The application was also tested by the customer during development to find out if there



is everything what they asked for and to test if it suits them. The development of the application still continues and new functionalities mentioned in the previous chapter are going to be implemented.

This project gave me a lot of valuable experiences in various fields of developing an information system for the customer. In past I already created some application but this project gave me an opportunity to learn new technologies and techniques for development. These experiences are very useful for my future career as a developer. Another experience comes from the contact with the customer. During improving the actually used and also during creating the new application I was communicating with the customer about all tasks and requirements, fixing problems and this learned me how to be more efficient in this communication, how to learn clients, how to use information systems etc. These experiences belong to skills called soft skills and it is very important for every professional to develop them. They are necessary not only for communication with clients but also very important in team of developers where all people have to cooperate and be effective. This is impossible if communication is not working. In communication with the customer these skills are improving presentation skills, helping to involve clients to development and make them part of the team. Then the customer is satisfied with the result and a fully satisfied customer is the mark of quality of the developing company.

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